

**ANNUAL CCR UNIT INSPECTION REPORT
LUMINANT – SANDOW 5 GENERATING PLANT
AX LANDFILL
MILAM COUNTY, TEXAS**

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PBW Project No. 5170B

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LUMINANT

1.0 INTRODUCTION

Luminant Power (Luminant) operates the Sandow 5 Generating Plant (Sandow 5) located approximately 7 miles southwest of Rockdale in Milam County, Texas (see Figure 1). Unit No. 5 is an approximately 581-megawatt, lignite-fired electric generation unit that was placed into service in 2009. Coal Combustion Residuals (CCRs) including fly ash and bed ash are generated as part of Unit No. 5 operation. CCR material is currently managed in the AX Landfill located approximately 7,500 feet south of Unit No. 5.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule was October 19, 2015.

The CCR Rule establishes operating criteria for existing CCR surface impoundments and landfills, including annual inspection requirements for all CCR units to ensure that the design, construction, operation, and maintenance of the CCR units are consistent with recognized and generally accepted good engineering standards. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to perform the 2015 annual inspection of the CCR units at Sandow 5. This report presents the findings of the 2015 annual inspection.

1.1 Annual CCR Landfill Inspection Requirements

Section 257.84(b) of the CCR Rule specifies that annual inspections be performed for CCR landfills by a qualified professional engineer. The annual CCR landfill inspection must include a review of available information regarding the status and condition of the CCR landfill including files available in the operating record, such as the results of inspections by the qualified person as required under Section 257.84(a), and the results of previous annual CCR inspections (where applicable) and visual inspection of the CCR landfill to identify signs of distress or malfunction of the landfill. The qualified professional engineer must prepare a report following each inspection that addresses the following:

- Any changes in geometry of the structure since the previous annual inspection;
- The approximate volume of CCR in the landfill at the time of the inspection;

- Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and
- Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

1.2 Sandow 5 Units Subject to Annual CCR Inspection Requirements

The CCR Rule defines coal combustion residuals such as fly ash, bottom/bed ash, boiler slag, flue gas desulfurization (FGD) materials (gypsum), and related solids generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The annual inspection requirements of the CCR Rule apply to surface impoundments and landfills that dispose or otherwise engage in solid waste management of CCRs.

No CCR surface impoundments are located at Sandow 5. The AX Landfill is the only CCR unit located at Sandow 5. The AX Landfill is located approximately 7,500 feet south of Sandow 5 on reclaimed mine land that is part of the Sandow Lignite Mine (Figure 2). The unit is used to manage CCRs generated from Unit No. 5, including fly ash and bed ash. The AX Landfill was registered with the TCEQ as a Class 2 Non-hazardous Waste Landfill in 2008, and the registration was updated in 2015. Cell 1 of the AX Landfill was constructed in 2014 and covers an area of approximately 40 acres. Cell 1 began receiving CCRs in May 2015 and was active at the time of the annual inspection. Cells 2 and 2A located adjacent to Cell 1 were under construction during the inspection.

Cell 1 is constructed partially above and partially below grade and is surrounded by engineered earthen dikes that extend approximately 10 to 15 feet above surrounding grade. A permanent, vegetated earthen embankment runs along the west side of the Cell 1. Temporary earthen embankments are located along the north, east and south sides of Cell 1.

Cell 1 is lined with an engineered liner system consisting of a 30 mil thick geomembrane supported geosynthetic clay liner (GSGCL) consisting of a sodium bentonite liner adhered to a 30 mil High Density Polyethylene (HDPE) geomembrane. The GSGCL is installed on top of a minimum of two feet of compacted soil exhibiting a minimum hydraulic conductivity of 5×10^{-5} cm/sec. An 18-inch layer of protective soil is placed on top of the GSGCL. No subsurface penetrations of the perimeter embankments occur at Cell 1.

2.0 RECORDS REVIEW

In accordance with the requirements of 40 CFR Part 257.84(b)(i), Luminant provided PBW with the following information from the facility operating records for the AX Landfill:

- Fugitive Dust Control Plan (FDCP) for the CCR units,
- weekly qualified person inspection records for the CCR units, and
- historical CCR unit design and construction documentation.

The 2015 annual inspection is the first annual inspection performed under the CCR Rule. As a result, no previous CCR annual inspections were available for review.

2.1 CCR Fugitive Dust Control Plan

The CCR FDCP for Sandow 5 dated October 2015 was reviewed by PBW as part of the annual CCR inspection process. The FDCP was certified by a Registered Professional Engineer on October 5, 2015, and placed into the operating record on October 19, 2015. The Sandow 5 CCR FDCP does include the following dust control measures:

- Water spray or fogging systems;
- Compaction;
- Vegetative cover; and
- Reduced vehicle speeds.

These dust control measures are implemented during transport and placement of CCR in the landfill. The FDCP includes provisions to amend the plan as necessary, and the plan includes a log for citizen complaints. No citizen complaints were recorded with the FDCP at the time of the annual inspection.

2.2 Weekly Qualified Person Inspection Records

PBW reviewed weekly qualified person inspection forms for the AX Landfill. Luminant initiated weekly CCR qualified person inspections at Sandow 5 during the week of October 12, 2015. Six weekly qualified person inspections were performed by Luminant prior to the annual inspection of the AX Landfill.

Items identified for monitoring or action at the AX Landfill during the 2015 weekly qualified person inspections can be summarized as follows:

- Monitor minor erosion on the south side of Cell 1 exterior embankment slope near the access ramp; and
- Monitor minor erosion beneath the inverts of two culverts near the toe of the exterior embankment on the west side of the landfill.

The overall status of the AX Landfill was reported as “satisfactory” during all weekly qualified person inspections. No conditions that could potentially disrupt the operation and safety of the landfill were reported.

2.3 CCR Unit Design and Construction Documentation

Luminant provided PBW with the following historical documents that included information concerning the design and construction of the AX Landfill:

- CCR Rule Compliance Evaluation Report – Sandow Steam Electric Station Unit No. 5 (Pastor, Behling & Wheeler, LLC (PBW), August 6, 2015).

A description of the design and construction characteristics for AX Landfill Cell 1 is presented in Section 1.2 of this annual report.

3.0 CCR LANDFILL FIELD INSPECTION

The 2015 annual inspection of AX Landfill Cell 1 on November 17, 2015. Patrick J. Behling, a registered professional engineer in the State of Texas, was accompanied by Luminant qualified persons during the inspection (Terry Richter, Bennett Jones, Landon Bippert and Jacob Gonzales).

The inspection consisted of a walking visual survey of the embankments, CCR placement area, and storm water control structures of Cell 1. Figure 3 summarizes the field observations from the inspections of AX Landfill Cell 1. Photographs of the landfill taken during the annual inspection are included as Appendix A. Figure 4 illustrates the location where photographs were taken during the inspection of the landfill. The following sections present the results of the annual inspection, including specific observations related to the structural elements of AX Landfill Cell 1.

The inspection requirements for CCR landfills include a review of the design, construction, operation and maintenance of the landfill in order to determine if the CCR unit meets generally accepted good engineering practice. The primary objective of the visual inspection of AX Landfill Cell 1 was to identify any evidence of actual or potential structural weakness of the CCR unit, including conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit. This is the initial annual inspection; hence, the recently completed weekly inspections and this annual inspection will serve as the baseline inspection for the AX Landfill.

Surface conditions in the vicinity of the landfill were wet during the inspection due to recent rains. Approximately 11.9 inches of precipitation was recorded at Sandow 5 during October 2015 and approximately 2.5 inches of rain was recorded between November 1 and November 17 at the facility.

3.1 Perimeter Embankments

The embankments surrounding AX Landfill Cell 1 were generally in very good condition. Consistent with the recently completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the perimeter embankments around the landfill were noted.

As indicated on Figure 3, the following areas were noted for future monitoring for AX Landfill

Cell 1:

- Minor erosion was observed below the inverts of two culverts near the toe of the exterior embankment on the west side of the landfill. This area should continue to be monitored and repaired if the erosion becomes severe.
- Minor erosion was observed in small areas along the exterior slopes of the temporary embankments on the north and south sides of Cell. These areas should continue to be monitored and repaired as necessary.
- Feral hog damage was observed in a small area on the exterior of the permanent embankment on west side of Cell 1. This area should be monitored and repaired as necessary.

3.2 Active CCR Placement Areas

CCRs are currently being placed in Cell 1. Approximately 538,000 cubic yards of CCRs were placed in AX Landfill Cell 1 during 2015.

3.3 Surface Water Controls

Contact water from Cell 1 remains in the cell and is used for dust control within the cell. The earthen embankments that surround Cell 1 prevent storm water run-on from areas outside the cell.

4.0 SUMMARY OF FINDINGS

The findings of the 2015 annual inspection of the AX Landfill are summarized herein. Luminant qualified persons responsible for the weekly inspections accompanied PBW during the annual inspection to ensure that observed conditions did not represent a change in geometry since previous inspection or have the potential to disrupt operation and safety of the CCR unit.

4.1 Visual Observation of Embankment Alignments

Consistent with recently completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the landfill were noted.

4.2 Landfill – Visual Observations of Structural Integrity

No conditions were observed during the annual inspection that indicates an actual or potential structural weakness of the perimeter embankments surrounding AX Landfill Cell 1. In addition, conditions observed during the annual inspection indicate that a disruption or the potential for disruption of the operation and safety of the CCR unit is not currently anticipated. A review of weekly inspections completed to date by Luminant and the completion of the annual inspection suggest that changes that may affect the stability or operation of the landfill have not been observed.

4.3 CCR Unit Volumes at Time of Inspection

Approximately 538,000 cubic yards of CCRs were placed in AX Landfill Cell 1 during 2015.

5.0 RECOMMENDATIONS

The following recommendations are based on the results of the 2015 annual CCR inspection of the AX Landfill:

- Luminant should continue to monitor the areas of concern listed in Section 3.0 of this report.
- This annual inspection report should be completed by filing the report in the operating record of the respective CCR units no later than January 19, 2016.
- The 2016 annual inspection of the AX Landfill should be performed in November/December 2016 unless otherwise required by the CCR rule.

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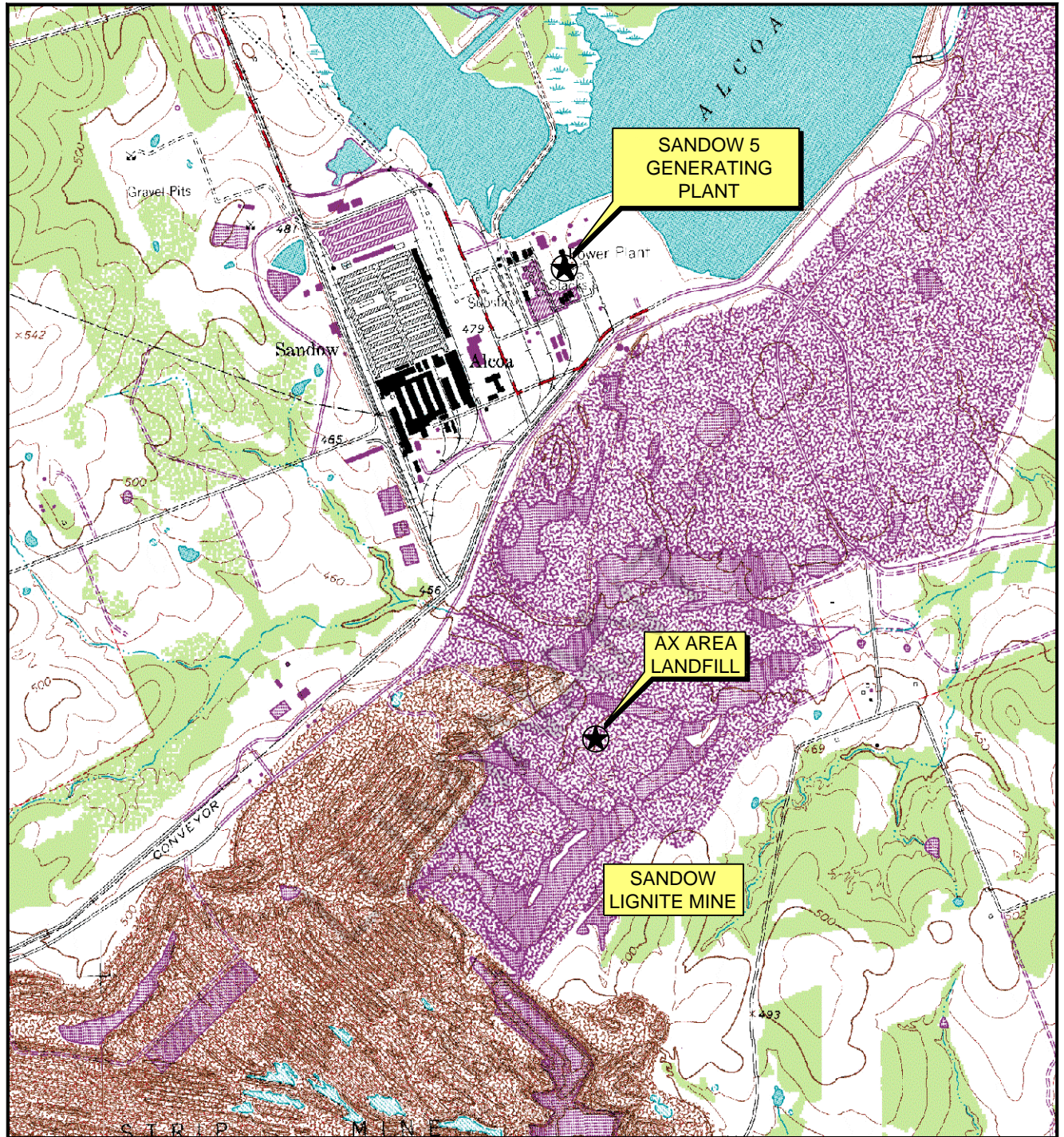
6.0 REFERENCES

Pastor, Behling & Wheeler, LLC (PBW), 2015. *CCR Rule Compliance Evaluation Report – Sandow Steam Electric Station Unit No. 5*, August 6.

LUMINANT

LUMINANT

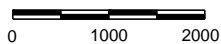
FIGURES



QUADRANGLE LOCATION



Scale in Feet



SANDOW 5 GENERATING PLANT
ROCKDALE, TEXAS

Figure 1

SITE LOCATION MAP

PROJECT: 5170B

BY: ADJ

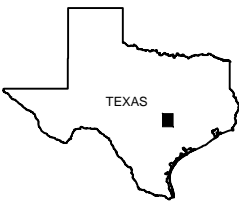
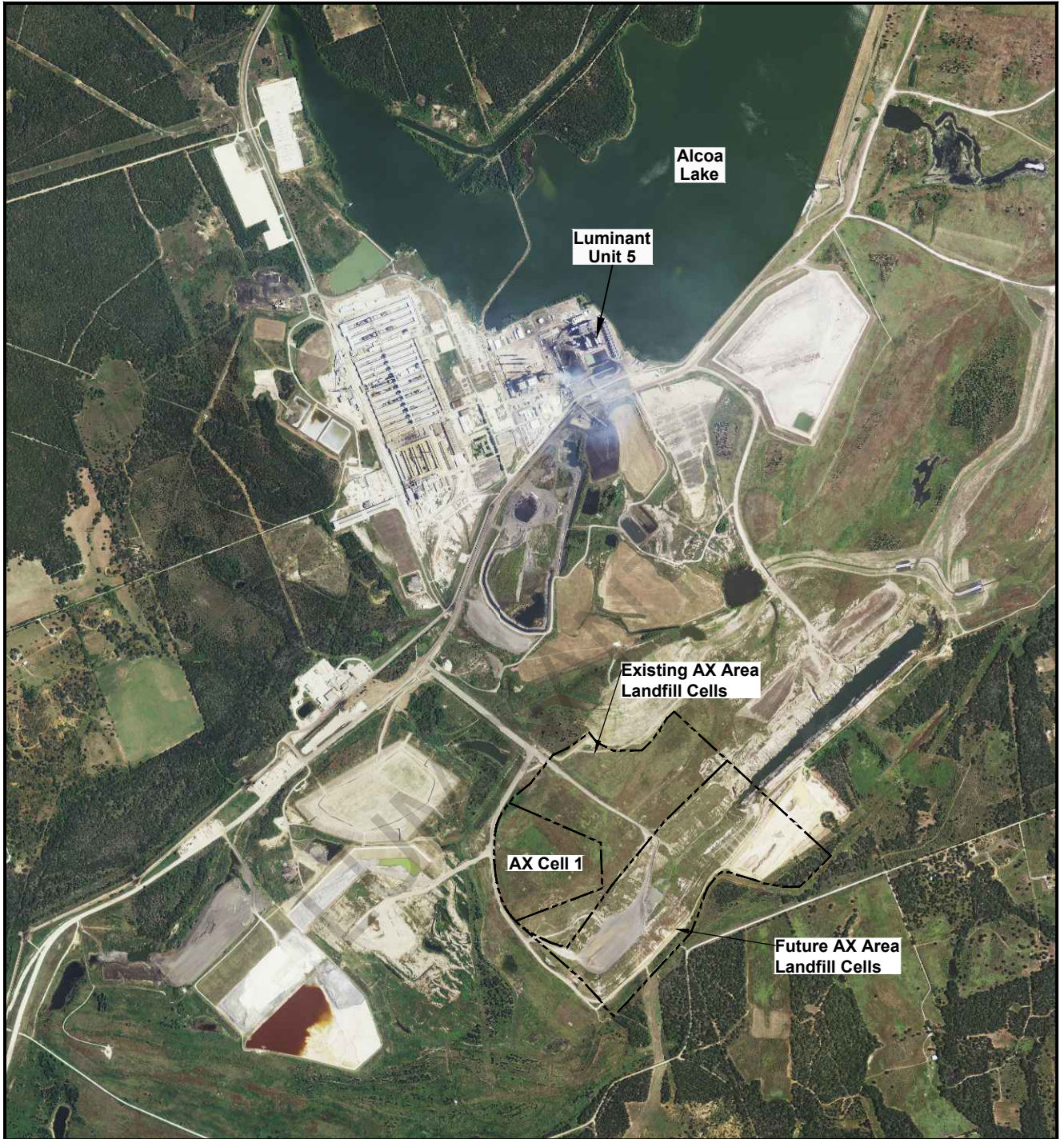
REVISIONS

DATE: DEC., 2015

CHECKED: PJB

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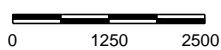
SOURCE:
Base map from www.tnris.gov, Alcoa Lake, TX 7.5 min. USGS quadrangle dated 1963,
revised 1988.



PHOTOGRAPH LOCATION



Scale in Feet



SANDOW 5 GENERATING PLANT
ROCKDALE, TEXAS

Figure 2

SITE VICINITY MAP

PROJECT: 5170B

BY: ADJ

REVISIONS

DATE: DEC., 2015

CHECKED: PJB

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SOURCE:
Imagery from www.tnris.gov, Alcoa Lake, aerial photographs, 2012.



MINOR
EROSION

AX LANDFILL CELL 2A
(UNDER CONSTRUCTION)

FERAL
HOG
DAMAGE

MINOR EROSION
AT CULVERT INLET

AX LANDFILL
CELL 1

MINOR
EROSION

AX LANDFILL CELL 2
(UNDER CONSTRUCTION)



Scale in Feet
0 150 300

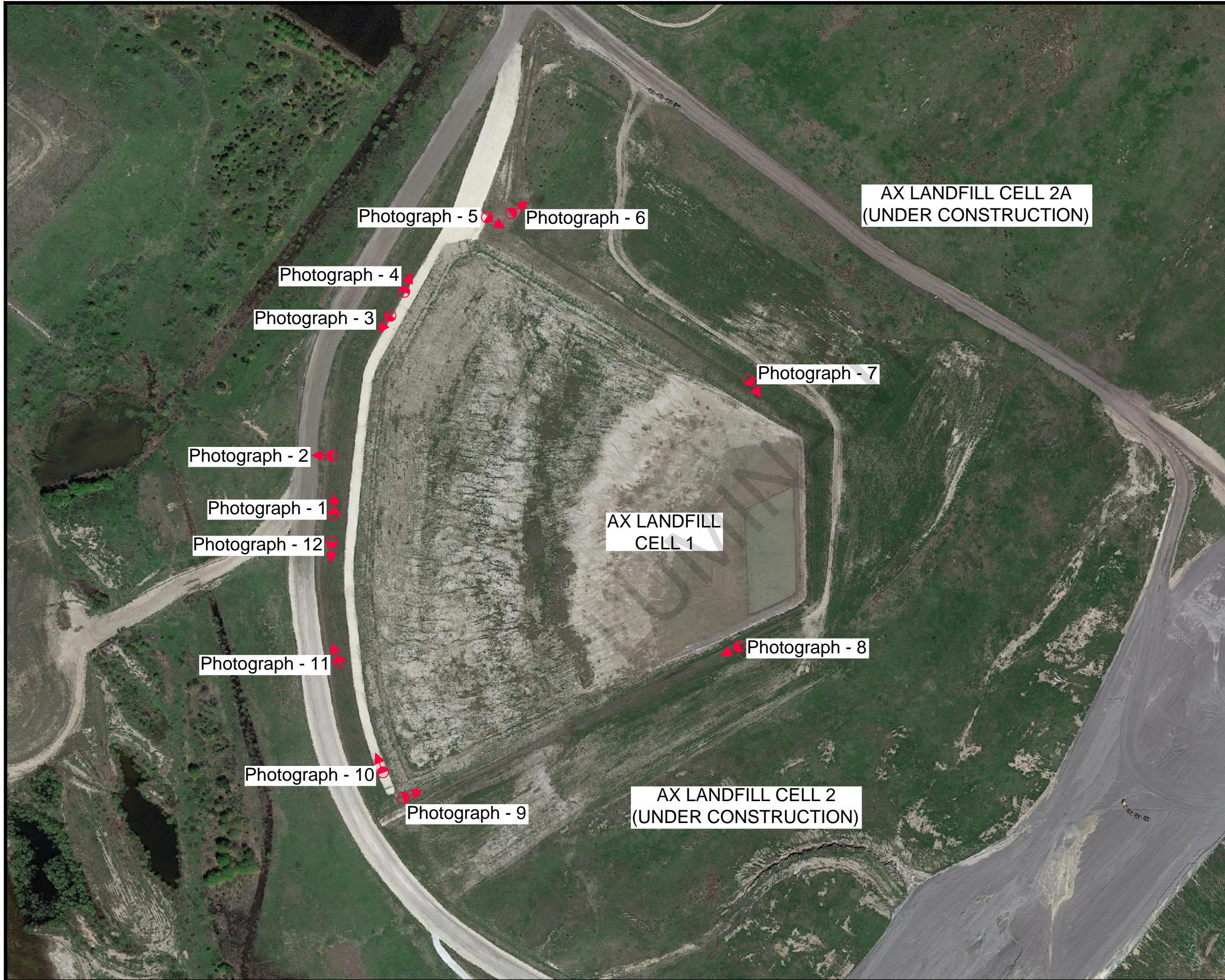
SOURCE:
Imagery from Google Maps dated 3/26/2015.

SANDOW 5 GENERATING PLANT
ROCKDALE, TEXAS

Figure 3
**ANNUAL INSPECTION
FINDINGS SUMMARY MAP
AX LANDFILL**

PROJECT: 5170B	BY: ADJ	REVISIONS
DATE: JAN., 2016	CHECKED: PJB	

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EXPLANATION

📍 Photograph Location and Direction

AX LANDFILL CELL 2A
(UNDER CONSTRUCTION)

AX LANDFILL
CELL 1

AX LANDFILL CELL 2
(UNDER CONSTRUCTION)

Photograph - 5

Photograph - 6

Photograph - 4

Photograph - 3

Photograph - 7

Photograph - 2

Photograph - 1

Photograph - 12

Photograph - 8

Photograph - 11

Photograph - 10

Photograph - 9



Scale in Feet
0 150 300

SOURCE:
Imagery from Google Maps dated 3/26/2015.

SANDOW 5 GENERATING PLANT
ROCKDALE, TEXAS

Figure 4
**ANNUAL INSPECTION
PHOTOGRAPH LOG
AX LANDFILL**

PROJECT: 5170B	BY: ADJ	REVISIONS
DATE: JAN., 2016	CHECKED: PJB	

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APPENDIX A
PHOTOGRAPHS – AX LANDFILL

LUMINANT



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 1 – (View N) View along toe of permanent earthen embankment of Cell 1. Cell 1 to right	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 2 – Minor erosion beneath two culverts at embankment toe on west side of Cell 1	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler PROJECT NO. 5170B	DESCRIPTION	Photograph 3 – (View S) View along crest of permanent embankment along west side of Cell 1. Cell 1 to left	
	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler PROJECT NO. 5170B	DESCRIPTION	Photograph 4 – (View N) View along middle of permanent embankment along west side of Cell 1	
	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 5 – (View SE) View along temporary embankment separating Cell 1 (right) from Cell 2A (left)	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 6 – Minor erosion on face of temporary embankment between Cell 1 and Cell 2A	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 7 – (View SE) Crest of temporary embankment between Cell 1 (right) and Cell 2A (left). Contact water contained in Cell 1 on right	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 8 – (View SW) View along crest of embankment between Cell 1 (right) and Cell 2 (left)	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 9 – (View NE) View along crest of temporary embankment between Cell 1 (left) and Cell 2 (right)	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 10 – (View NW) View along crest of permanent embankment along west side of Cell 1	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 11 – (View N) View along crest of permanent embankment along west side of Cell 1	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 12 – (View S) View along crest of permanent embankment along west side of Cell 1	
PROJECT NO. 5170B	SITE NAME	Sandow 5 Generating Plant – AX Landfill Annual Inspection	DATE 11/17/2015